

Patent Claims:

1. Method for the milling of freeform surfaces on workpieces on a milling apparatus or a milling machine, especially for the 5-axis milling, whereby a workpiece is milled by a tool of the milling machine in such a manner that a desired freeform surface arises, and whereby the tool is moved relative to the workpiece for the milling along at least one tool path defined via support points, characterized in that
  - a) the support points of the or each tool path are defined either in workpiece coordinates or in machine coordinates,
  - b) for each tool path at least one spline is produced in connection with the support points,
  - c) the or each spline is output to a control arrangement of the milling machine, whereby the control arrangement controls the motion of the tool along the or each tool path on the basis of the or each corresponding spline.
2. Method according to claim 1, characterized in that, when the support points are defined in workpiece coordinates, then six coordinates are specified for each support point.
3. Method according to claim 1, characterized in that, when the support points are defined in machine coordinates, then five coordinates are specified for each support point.

- 1 4. Method according to one or more of the claims 1 to 3,  
2 characterized in that, for each tool path respectively one  
3 spline is laid along or through all coordinates of the  
4 support points.
- 1 5. Method according to claim 4, characterized in that, when  
2 the support points are defined in workpiece coordinates,  
3 then six splines are produced for each tool path.
- 1 6. Method according to claim 4, characterized in that, when  
2 the support points are defined in machine coordinates, then  
3 five splines are produced for each tool path.
- 1 7. Method according to one or more of the claims 1 to 6,  
2 characterized in that for each tool path, the interpolation  
3 parameters for all splines of the respective tool path are  
4 equal, so that all splines of a respective tool path are  
5 synchronized.
- 1 8. Apparatus for the milling of freeform surfaces on  
2 workpieces, especially 5-axis milling apparatus, whereby a  
3 tool mills a workpiece in such a manner that a desired  
4 freeform surface arises, with a programming arrangement  
5 (21) for the programming of at least one tool path or  
6 miller path through support points, and with at least one  
7 control arrangement (28) for the control of the motion of  
8 the tool along the or each tool path relative to the

workpiece, characterized in that the support points of the or each tool path are programmable in workpiece coordinates or in machine coordinates in the programming arrangement (21), that means (25) are allocated to the programming arrangement (21) in order to produce at least one spline for each tool path in connection with the support points, and that the means (25) provide the or each spline to the or each control arrangement (28), whereby the or each control arrangement (28) controls the motion of the tool along the or each tool path on the basis of the or each corresponding spline.

9. Apparatus according to claim 8, characterized in that the programming arrangement (21) is embodied as a CAD/CAM system for the programming of the or each tool path, whereby the CAD/CAM system produces at least one APT file (22), which is transferable by at least one subsequent connected post-processor (26) into at least one control file (27) that is executable by the or each control arrangement (28).

10. Apparatus according to claim 8 or 9, characterized in that the means (25) allocated to the programming arrangement (21) transfer the splines to an APT processor (23), which transfers these splines to the or each post-processor (26), whereby the or each post-processor (26) provides the splines to the or each control arrangement (28) in a polynomial format.